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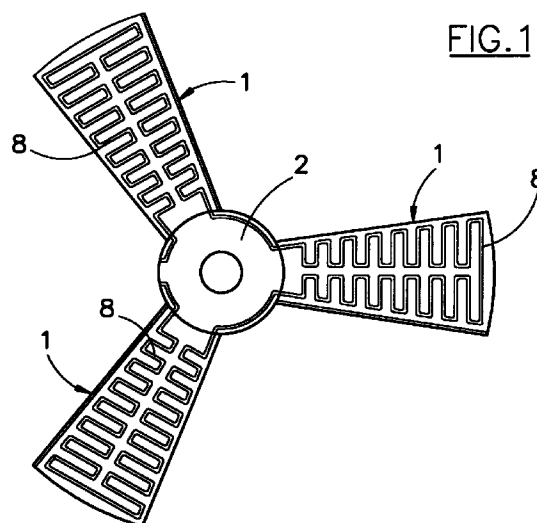
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(54) **Electrically heated fan**

(57) A series of fans for hot air conveyors with rotating fan has the common characteristics to have blades (1; 16; 33) with resistive electric paths (8; 16; 34) that are electrically supplied in order to generate by themselves heat for the heating of the conveyed air. The resistive electric paths can be made of resistors (8; 34) that are applied to the blades (1; 33) or else they can be defined by the same blades (16), made of electrically conductive material.



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Description

[0001] The present invention concerns a series of self-heating fans for hot air conveyors with rotating fan.

[0002] Normally, fans for the aforementioned uses serve limitedly to generate an air flow, whose heating is provided by appropriate heating elements (in particular with electric resistor) located upstream or downstream of the fan.

[0003] The presence of such heating elements in the air flow circuit determines undesirable load losses, together with dimensional problems.

[0004] Object of the present invention is now to realise a series of fans that would autonomously heat themselves without the need of the use of separate heating elements upstream or downstream of the same ones in the air flow circuit.

[0005] According to the present invention, such object is attained by means of a series of fans that have the common characteristics to have blades with resistive electric paths that are electrically supplied in order to generate by themselves heat for the heating of the conveyed air.

[0006] In this way the blades of the fan wheel, electrically supplied through the shaft of the fan wheel or by means of sliding electric contacts, heat themselves and, by substituting the usual heating elements, in turn irradiate heat which provides to the heating of the conveyed air flow.

[0007] The elimination of the heating elements allows to prevent load losses in the air flow circuit and it minimises problems of dimension.

[0008] The cost of the fans according to the invention will obviously be higher than the one of the traditional fans, but however lower than the sum of the costs of fan and of heating elements.

[0009] Some embodiments of the fans according to the invention are illustrated as a non-limiting example in the enclosed drawings, in which:

Figure 1 shows a bottom plan of a first axial fan for ceiling fan according to the present invention;

Figure 2 shows such axial fan in a partially sectioned lateral view;

Figure 3 shows a bottom plan of a second axial fan for ceiling fan according to the present invention;

Figure 4 shows the same axial fan in partially sectioned lateral view;

Figure 5 shows, partly in lateral view and partly in axial section, a tangential fan according to the present invention;

Figure 6 shows said tangential fan as viewed from the right in relation to Figure 5;

Figure 7 shows said tangential fan as viewed from the left in relation to Figure 5;

Figure 8 shows said tangential fan in a transverse section according to line VIII-VIII of Figure 5;

Figures 9 and 10 show, respectively in a partially

sectioned lateral view and in a view from the left, a first example of power supply of the tangential fan of Figures 5-8;

Figures 11 and 12 show, respectively in partially sectioned lateral view and in a view from the left, a second example of power supply of the tangential fan of Figures 5-8;

Figure 13 shows in an axial section a centrifugal fan as viewed from the right as regards Figure 13;

Figure 14 shows the aforementioned centrifugal fan as viewed from the right as regards Figure 13;

Figure 15 shows the same centrifugal fan as viewed in section according to line XV-XV of Figure 13.

[0010] The axial fan of Figures 1 and 2, for example provided for a ceiling fan, comprises three equally distanced blades 1, that extend radially from a supporting central body 2, that is fixed to the external turning part 3 of an electric motor 4, whose internal fixed part 5 is supported by a rod 6 for example hung on a ceiling 7.

[0011] On one or both faces of each blade 1 an electric resistor 8, of metallic or chemical material, is applied by serigraphy and is connected in series with analogous resistors of the other two blades in order to form a single resistor whose ends are connected with as many electric conductors 9, 9', that terminate in turn with brushes 10, 10' that are fixed to the rotating part 3 of the motor 4. The two brushes 10, 10' slide on respective slip rings 11, 11' that are fixed to the rod 6 and provided with an appropriate power supply.

[0012] While the fan rotates thus creating an air flow, the resistors 8 are in this way electrically supplied and generate heat for the Joule effect thus heating the blades 1. These release in turn heat to the air flow, thus heating it.

[0013] The axial fan of Figures 3 and 4 is analogous to the one of Figures 1 and 2, of which it repeats most of the reference numbers, with the exception consisting in that each blade itself is made of an electrically conductive material, or it is entirely coated with such material, and it shows a central longitudinal slot 12 which divides it into two parts 13, 13', laid side by side, having external ends in common and internal ends that are separate and connected by means of wires 14, 14' to one and the other of the two electrical conductors 9, 9'.

[0014] The tangential fan of Figures 5-8 is made up of two terminal disks 15 of electrically insulating material, from one to the other of which a single strip 16 of electrically conductive flexible material extends, which engages in pairs of radial slots 17 of the disks 15 in order to form a circumferential sequence of conductive blades extending from one disk to the other. A helicoidal spring 18 winding on a central shaft 19 and reacting between one of the disks 15 and an intermediate flange 20 of the shaft 19 keeps the conductive strip 16 opportunely in tension.

[0015] The electric supply for the blades 16 can be supplied in the way shown in Figures 9 and 10, that is

hooking the opposite ends 21 and 22 of the strips 16 to the external face of one of the disks 15, in correspondence of conductive bumps 23 and 24 in turn electrically communicating with respective slip rings 25 and 26 that develop on the same aforementioned strip and on which
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respective brushes 27 and 28 connected with electric conductors 29 and 30 slide.

[0016] As an alternative, as shown in Figures 11 and 12, one of the slip rings can be developed along the perimeter back of the disk and be in electrical contact
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with a respective brush that is sliding on the same back.

[0017] Finally, the centrifugal fan of Figures 13-15 comprises a rotating disk 31, that is fixed to a small supporting and control shaft 32 and from one face of which
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arched blades 33 extend perpendicularly on which respective resistors 34 in metallic or chemical material are made by serigraphy.

[0018] The electric resistors 34 are electrically supplied by means of an electric connection of respective
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ends 35 and 36 of the same resistors to respective slip rings 37 and 38 that are provided on the opposite face of the disk 31 and that are co-operating with respective brushes 39 and 40 connected with electrical conductors 41 and 42.

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Claims

1. Series of fans for hot air conveyors with rotating fan, characterised in that they have blades (1; 16; 33) with resistive electric paths (8; 16; 34) that are electrically supplied in order to generate by themselves
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heat for the heating of the conveyed air.
2. Fan according to claim 1, characterised in that said resistive electric paths are made of resistors (8; 34)
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that are applied to the blades (1; 33).
3. Fan according to claim 1, characterised in that said resistive electric paths are defined by the same blades (16), that are made of electrically conductive
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material.
4. Fan according to claim 3, characterised in that said blades (16) of electrically conductive material are made of a single flexible strip that is engaged alternatively in pairs of radial slots created in one or the
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other of two parallel disks that are elastically biased in a distant position in order to keep said strip in tension.
5. Fan according to any one of the previous claims, characterised in that said resistive paths are supplied by turning electric connection means with
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brushes and slip rings.

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FIG.1

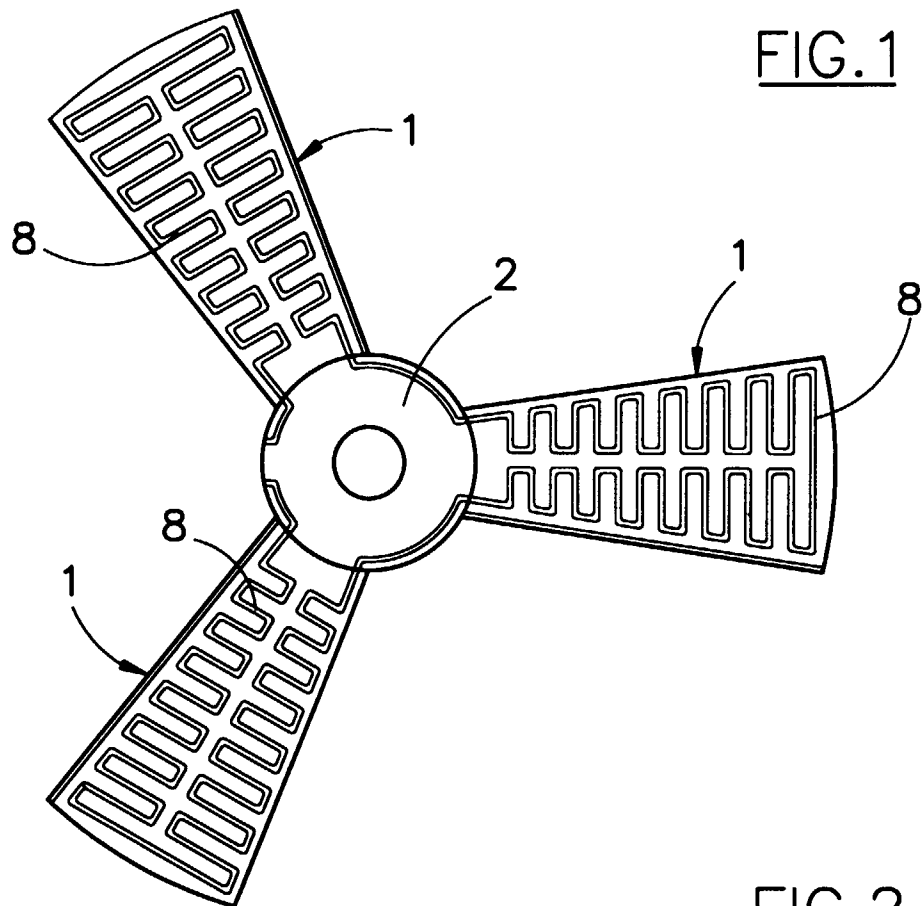
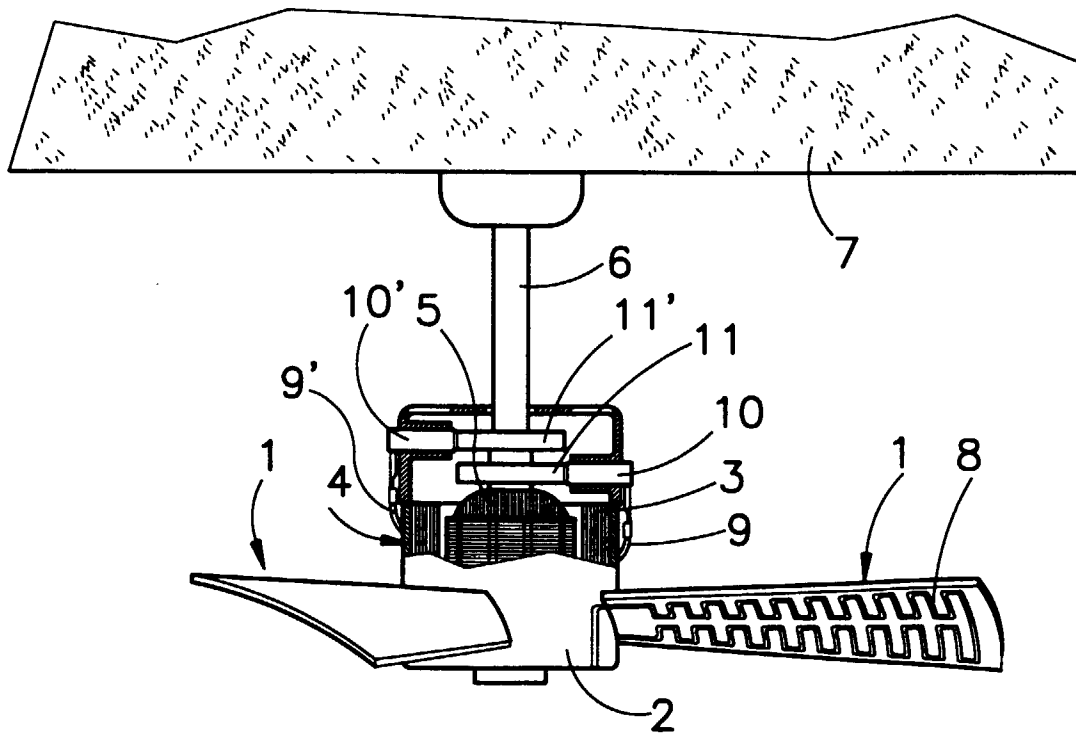


FIG.2



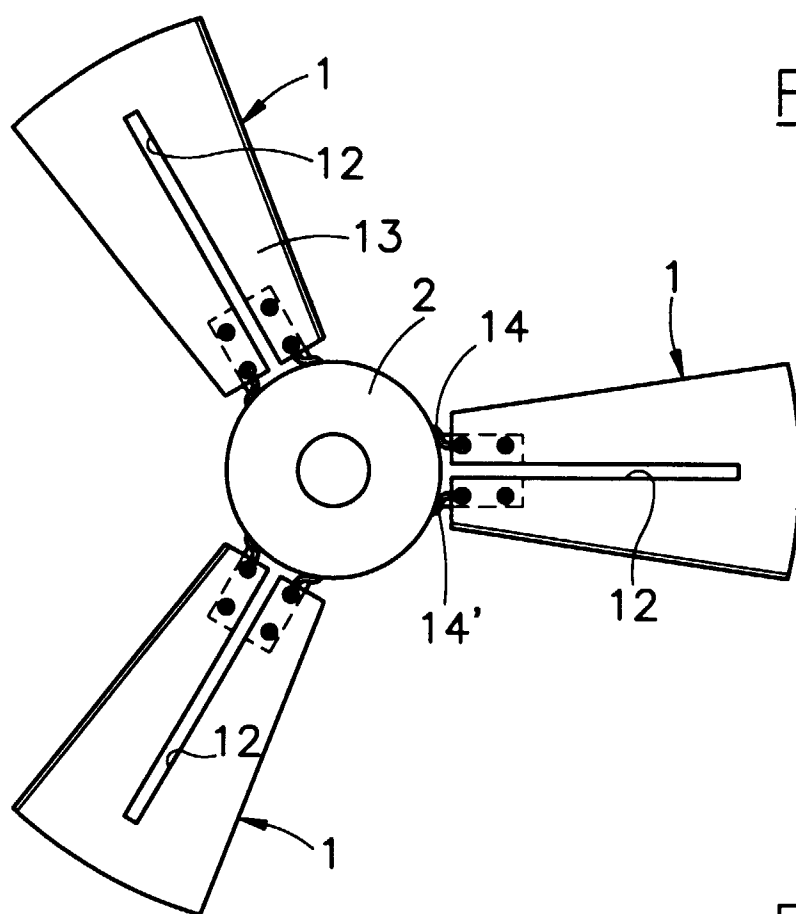


FIG. 3

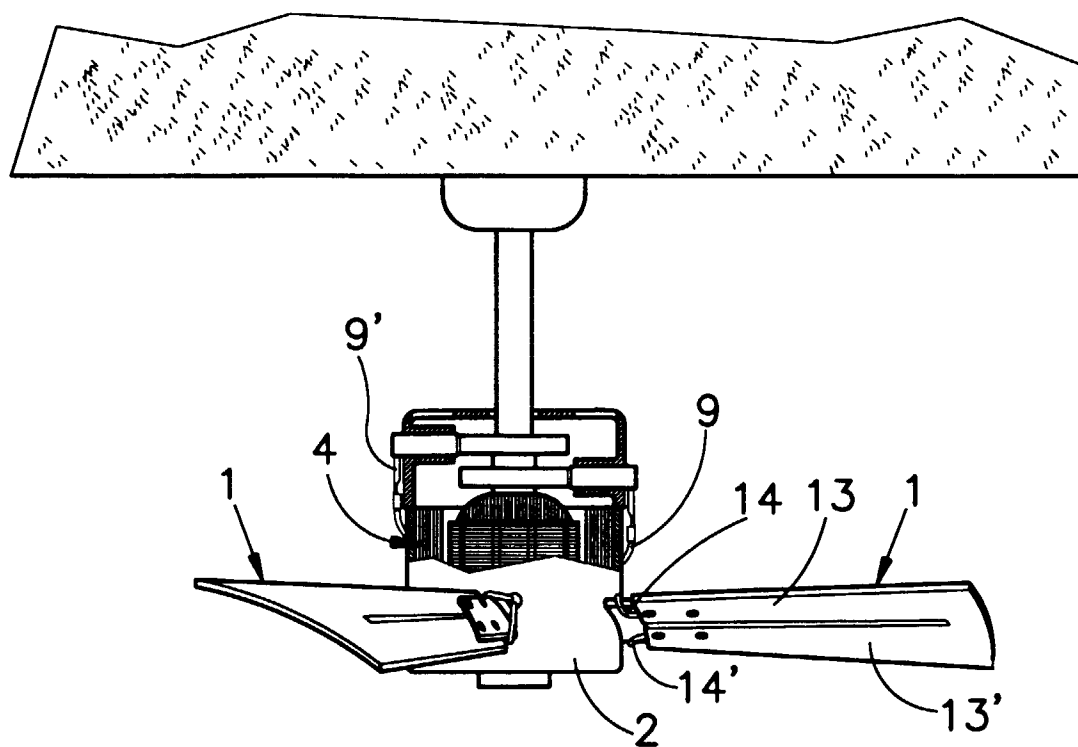


FIG. 4

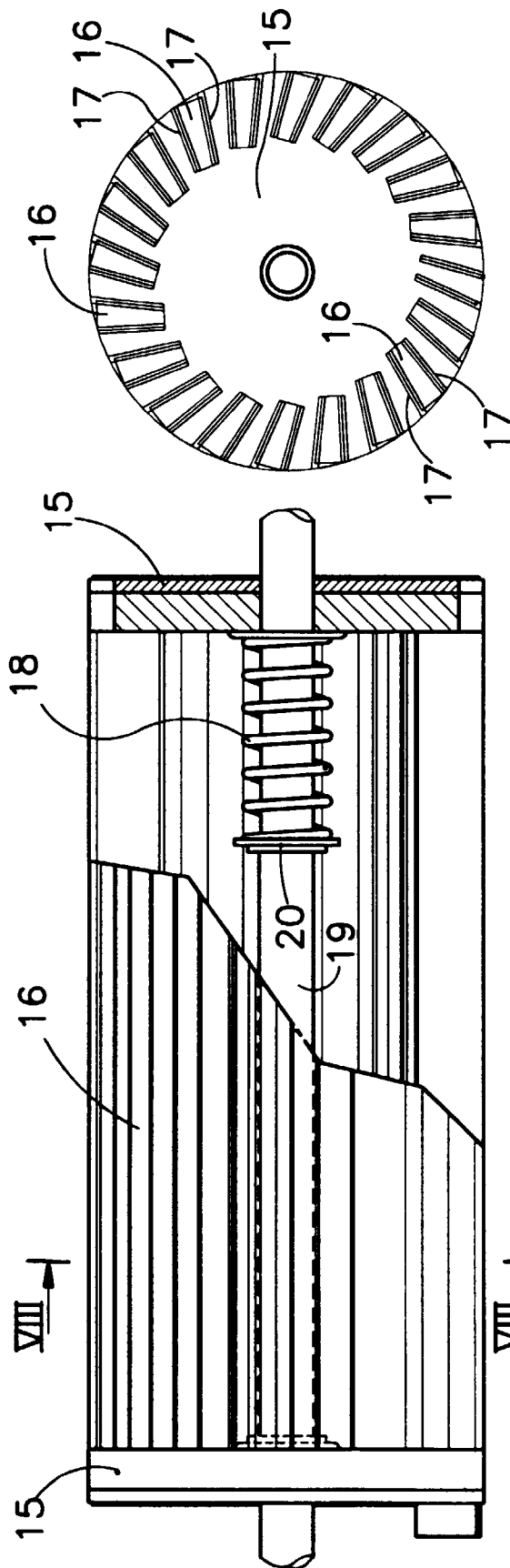


FIG. 5

FIG. 6

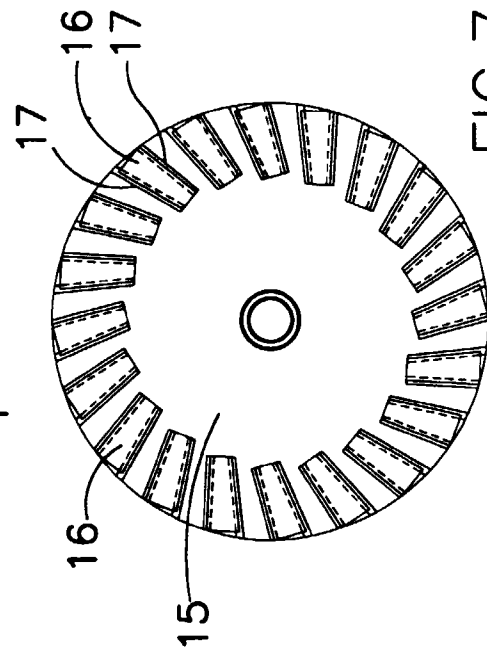


FIG. 7

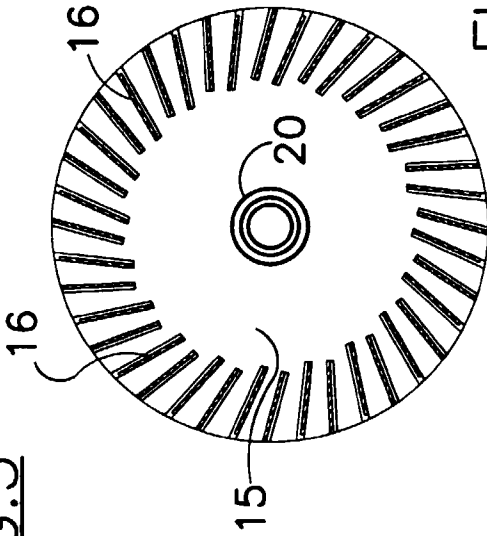
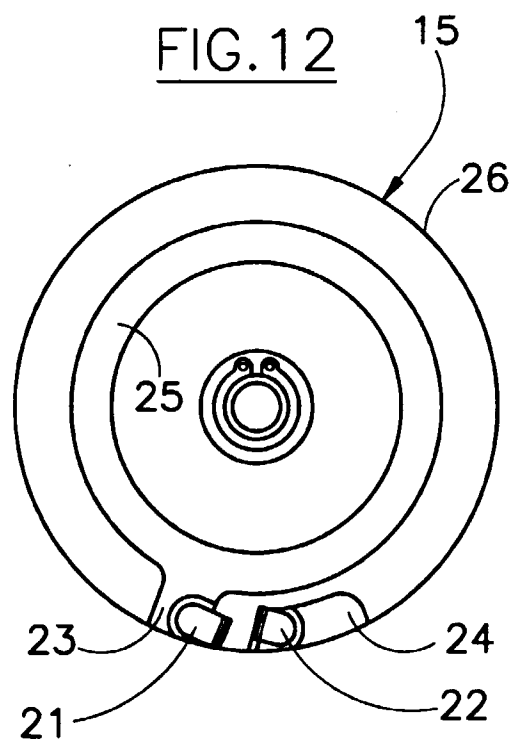
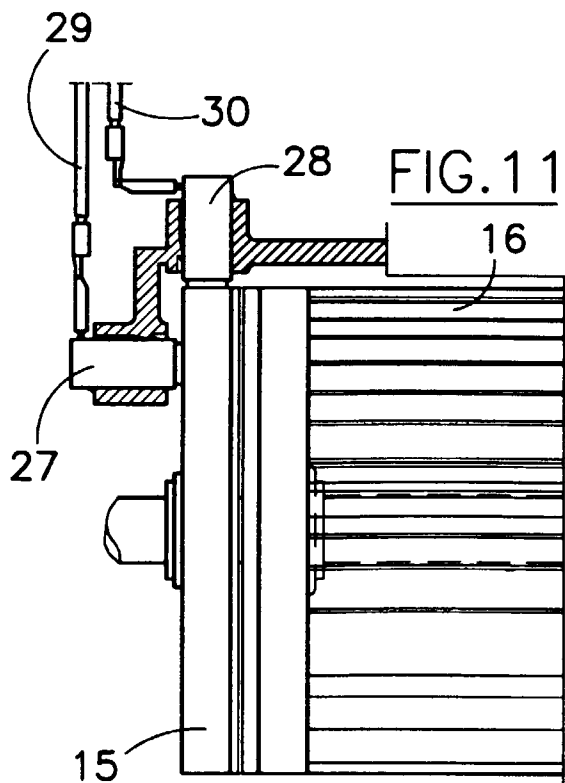
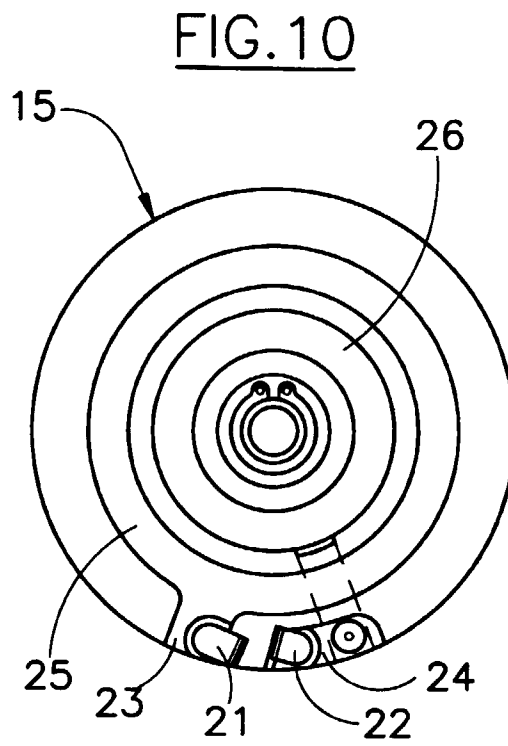
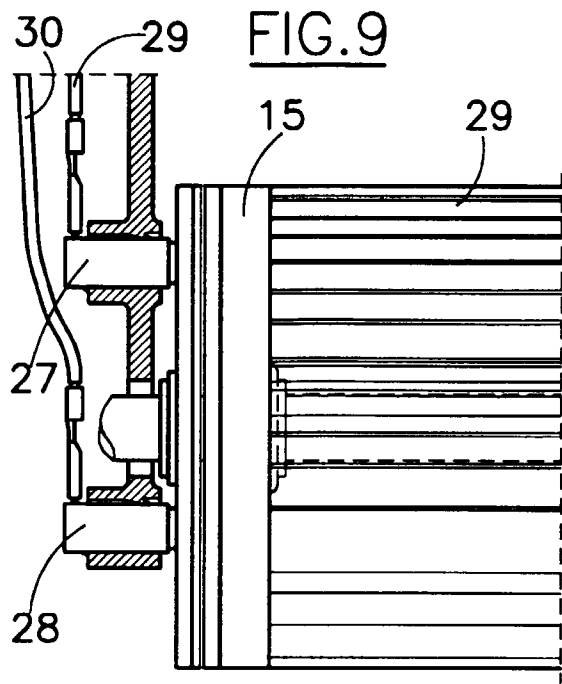


FIG. 8



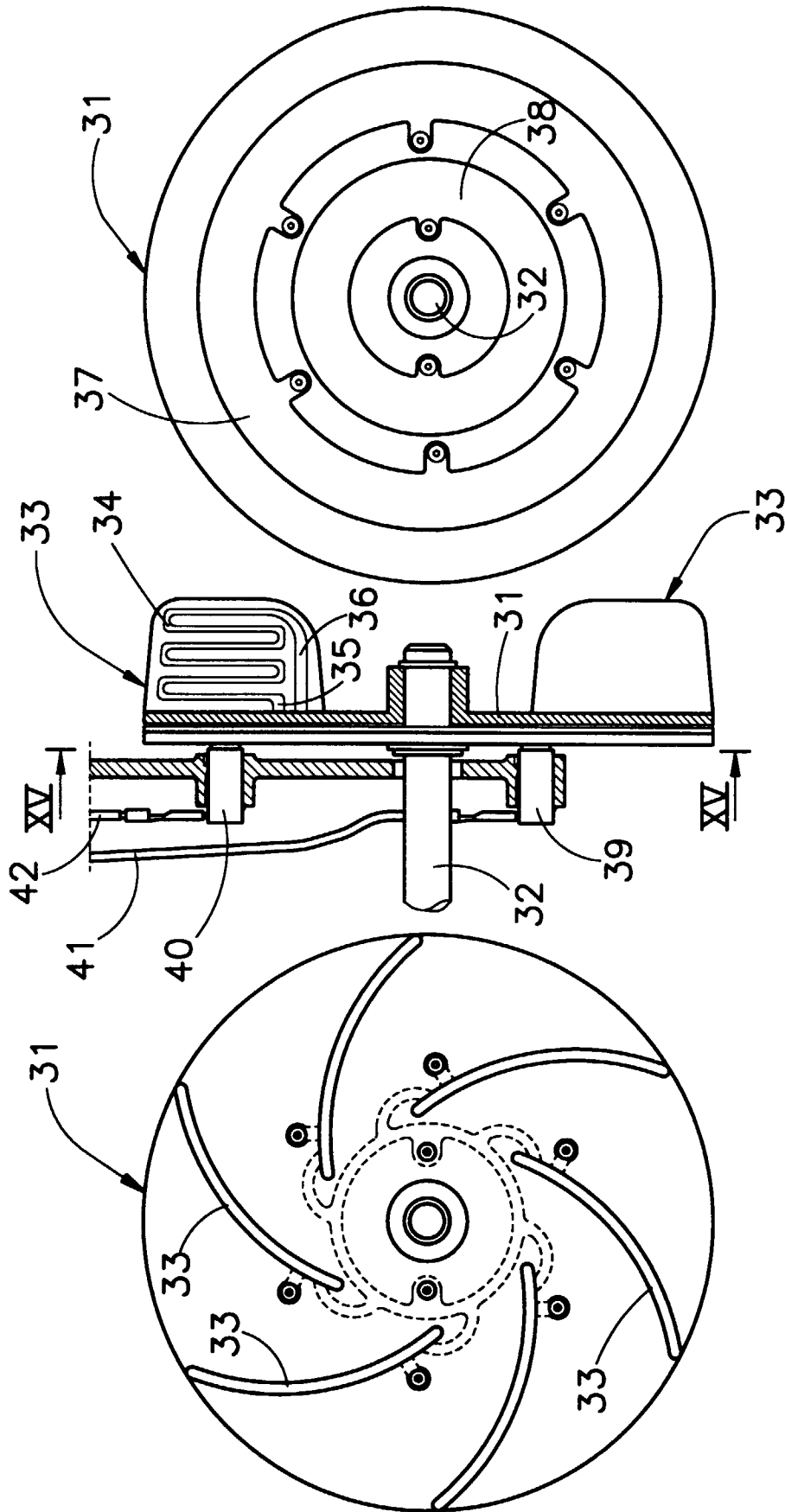


FIG.15

FIG.13

FIG.14